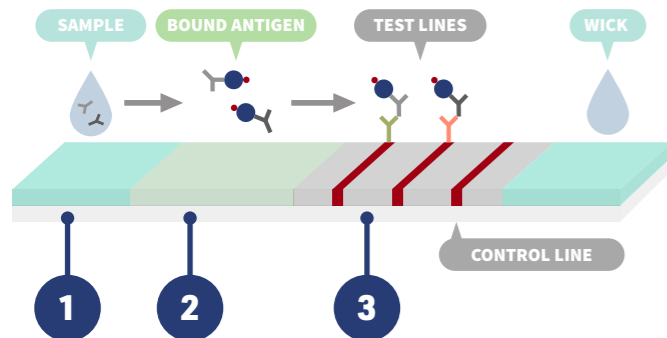


ANTIBODY TESTS PART 2: HOW DO THE TESTS WORK?

RAPID DIAGNOSTIC TESTS

These tests are similar to pregnancy tests. They are small, portable, and give quick results.



1 The patient sample is added here. The sample and any antibodies it contains then flows down the strip.

2 This part of the test strip contains the antigen attached to gold nanoparticles. If there are antibodies in the patient sample for the antigen they bind to it, carrying the antigen (and the gold particles) with them.

3 At the test lines, antibodies from the sample are captured. The gold nanoparticles they carried with them make the test line turn red to indicate a positive test. The control line shows the test has worked correctly.



The test usually takes 10–30 minutes.

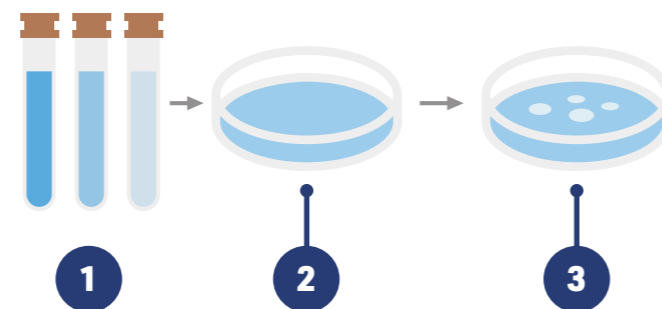
WHAT CAN THIS TEST TELL US?



- ✓ Are antibodies present in the sample?
- ✗ The level of antibodies in the sample
- ✗ How effective are the antibodies?

NEUTRALISATION ASSAY TEST

This test is lab-based and takes several days. It can tell us how effectively patient antibodies can neutralise a virus.



1 Serial dilutions of the patient sample are mixed with a suspension of the virus (the concentration of which remains constant).

2 The combination of patient samples and virus suspensions are incubated then added to host cells in a petri dish. The dishes are covered in agar and incubated.

3 A plaque forms on the dish contents over several days. Antibodies to the virus in the patient sample reduce plaque formation. Results at different dilutions help us know how effectively the patient antibodies block the replication of the virus.



The test usually takes 3–5 days.

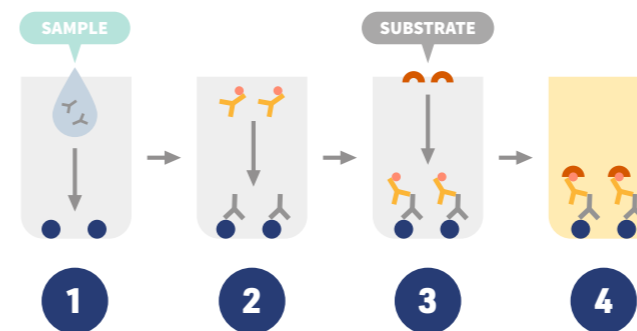
WHAT CAN THIS TEST TELL US?



- ✓ Are antibodies present in the sample?
- ✗ The level of antibodies in the sample
- ✓ How effective are the antibodies?

ELISA

Enzyme-linked immunoabsorbent assay tests (ELISA) are lab-based and take a few hours. A common example is shown below.



1 The patient sample is added to a microplate well coated with deactivated antigen or a protein from the antigen, then incubated.

2 If the patient sample has antibodies to the antigen, they bind to the antigen or protein. Enzyme-labelled antibodies are then added which bind to the patient antibodies.

3 The enzyme substrate is added.

4 The substrate changes colour when it binds to the enzyme. The intensity of the colour links to the level of antibodies in the sample.



The test usually takes 2–5 hours.

WHAT CAN THIS TEST TELL US?



- ✓ Are antibodies present in the sample?
- ✓ The level of antibodies in the sample
- ✗ How effective are the antibodies?

OTHER IMMUNOASSAYS

A number of other tests work on a similar basis to ELISA but have notable differences.

CHEMILUMINESCENT IMMUNOASSAY (CLIA)



Similar to ELISA, but the substrate added causes a light-producing chemical reaction. The amount of light produced links to the sample antibody levels.



The test usually takes 1–2 hours to run.

ELECTROCHEMILUMINESCENCE IMMUNOASSAY



Uses electrochemiluminescent labels, which produce light when an electric current is applied. The amount of light produced links to the sample antibody levels.



The test usually takes under an hour.

OTHER TYPES

Other types of immunoassay include fluorescence and microsphere immunoassays.

WHAT CAN THESE TESTS TELL US?



- ✓ Are antibodies present in the sample?
- ✓ The level of antibodies in the sample
- ✗ How effective are the antibodies?

